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Groundwater Monitoring Plan for the Test Reactor Area Operable Unit 2-13



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September 2003

**Prepared for the
U.S. Department of Energy
Idaho Operations Office**

ABSTRACT

The *Final Record of Decision for Test Reactor Area, Operable Unit 2-13* was signed in December 1997 and provides for groundwater monitoring to assess future contaminant concentrations at the Test Reactor Area at the Idaho National Engineering and Environmental Laboratory. Based upon recommendations provided in the *First Five-Year Review Report for the Test Reactor Area, Operable Unit 2-13, at the Idaho National Engineering and Environmental Laboratory*, the groundwater monitoring requirements have been modified, focusing on those contaminants of concern that warrant continued surveillance including chromium, tritium, strontium-90, and cobalt-60. This Groundwater Monitoring Plan describes the objectives, activities, and assessment procedures that will be performed to support the ongoing groundwater-monitoring requirements as stipulated in the 5-year review.

SUMMARY

The *Final Record of Decision for Test Reactor Area, Operable Unit 2-13*, was signed in December 1997 and provided for groundwater monitoring to assess future contaminant concentrations at the Test Reactor Area at the Idaho National Engineering and Environmental Laboratory. Based on recommendations provided in the *First Five-Year Review Report for the Test Reactor Area, Operable Unit 2-13, at the Idaho National Engineering and Environmental Laboratory*, groundwater monitoring requirements have been modified focusing on those contaminants of concern that warrant continued surveillance including chromium, tritium, strontium-90, and cobalt-60. This Groundwater Monitoring Plan describes the objectives, activities, and assessment procedures that will be performed to support the ongoing groundwater monitoring requirements as stipulated in the 5-year review.

Monitoring activities have been designed to verify the contaminant concentration trends in the Snake River Plain Aquifer, predicted by the Operable Unit 2-12 computer model, and to evaluate the effects that discontinued discharge to the warm waste pond has on the underlying water bodies. In addition, the deep-perched water system will be monitored for potential contaminant migration driven by continued discharges to the Cold Waste Pond. To meet these objectives, groundwater monitoring will be performed on seven wells completed in the deep-perched water system (PW-11, PW-12, PW-14, USGS-53, USGS-54, USGS-55, and USGS-56) and seven wells completed in the Snake River Plain Aquifer (Hwy-3, TRA-06, TRA-07, TRA-08, USGS-58, USGS-65, and MIDDLE-1823).

Water samples will be collected semiannually for the four contaminants of concern that warrant continued groundwater monitoring, including chromium, tritium, strontium-90, and cobalt-60. As described in the 5-year review, the Idaho Department of Environmental Quality recommended that samples also be collected for iodine-129 and technetium-99 analysis during the first round of sampling performed following completion of the review.

In accordance with the requirements of the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory*, quality-assured data collected during groundwater monitoring will be submitted to the Agencies (i.e., U.S. Department of Energy Idaho Operations Office, Idaho Department of Environmental Quality, and U.S. Environmental Protection Agency) no later than 120 days from the time of collection. Data summary submittals and updates of information will be transmitted on the status of trending data in the form of an interim report. In addition, a second 5-year review will be prepared by December 21, 2007, that will describe the results of the ongoing groundwater monitoring efforts and the impact on the protectiveness of the selected remedy. This second 5-year review will discuss changes to the hydrogeologic setting over the 5 years leading up to the review; the measured contaminant concentrations versus the model-predicted concentrations, data trends, and future predicted concentrations; and recommendations for the next 5 years of groundwater monitoring.

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ACRONYMS

ARA	Auxiliary Reactor Area
ARAR	applicable or relevant and appropriate requirement
ARDC	Administrative Records and Document Control
BBWI	Bechtel BWXT Idaho, LLC
bls	below land surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CSA	CERCLA Storage Area
CWSU	CERCLA Waste Storage Unit
DOE-ID	U.S. Department of Energy Idaho Operations Office
DOT	U.S. Department of Transportation
DQO	data quality objective
DS	decision statement
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
FSP	Field Sampling Plan
FTL	field team leader
GDE	guide
GFPC	gas-flow proportional counting
GMP	Groundwater Monitoring Plan
HASP	Health and Safety Plan
HDPE	high-density polyethylene
Hwy	highway
ID	identification
IDAPA	Idaho Administrative Procedures Act
INEEL	Idaho National Engineering and Environmental Laboratory

MCP	management control procedure
OU	operable unit
PBF	Power Burst Facility
PPE	personal protective equipment
PQL	practical quantitation limit
PRD	program requirements document
PSQ	principal study question
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RI/BRA	remedial investigation/baseline risk assessment
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SOW	Statement of Work
SRPA	Snake River Plain Aquifer
TPR	technical procedure
TRA	Test Reactor Area
USGS	United States Geological Survey
WAC	Waste Acceptance Criteria
WAG	waste area group
WGS	Waste Generator Services
WROC	Waste Reduction Operations Complex

Groundwater Monitoring Plan for the Test Reactor Area Operable Unit 2-13

1. INTRODUCTION

In December 1997, the *Final Record of Decision for Test Reactor Area, Operable Unit 2-13*, was signed (DOE-ID 1997a). The comprehensive Record of Decision (ROD) presents the selected remedial actions and provides for groundwater monitoring to assess future contaminant concentrations at the Test Reactor Area (TRA) at the Idaho National Engineering and Environmental Laboratory (INEEL). This Groundwater Monitoring Plan (GMP) was originally developed to address the post-ROD monitoring requirements identified in the Operable Unit (OU) 2-13 Record of Decision (ROD) for the Snake River Plain Aquifer (SRPA) and the deep-perched water system at the TRA. Based on the *First Five-Year Review Report for the Test Reactor Area, Operable Unit 2-13, at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 2003a), it was recommended that the semiannual monitoring effort be focused on those contaminants of concern that warranted continued surveillance.

This GMP describes the objectives, activities, and assessment procedures that will be performed to support the groundwater quality-monitoring requirements as stipulated in the 5-year review. This plan has been prepared pursuant to the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR 300) and is consistent with U.S. Environmental Protection Agency (EPA) guidance documents. This GMP is comprised of two parts: (1) the Field Sampling Plan (FSP) and (2) the Quality Assurance Project Plan (QAPjP). The FSP describes the field-sampling activities that will be performed, while the QAPjP details the processes and programs that will be used to ensure that the data generated are suitable for their intended uses. The governing QAPjP for this sampling effort is the *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002). This document is incorporated herein by reference.

1.1 Regulatory Background

In December 1992, the ROD was issued for the OU 2-12 TRA perched water system (DOE-ID 1992). It was determined that no remedial action was necessary for the deep-perched water system to ensure protection of human health and the environment. That decision was based on the results of human health and ecological risk assessments, which determined that conditions at the site pose no unacceptable risks to human health or the environment for expected or future use of the SRPA beneath the deep-perched water system at the TRA. One of the assumptions for the no-remedial-action decision was that groundwater monitoring would be performed to verify that contaminant concentration trends follow those predicted by the OU 2-12 computer model. It was further stated in the OU 2-12 ROD that a statutory review of this decision would be conducted by the three agencies within 3 years to ensure that adequate protection of human health and the environment continues to be provided (DOE-ID 1992).

The results from the OU 2-12 groundwater monitoring are described in a series of three annual technical memoranda. Following 3 years of groundwater monitoring, the results from the entire OU 2-12 post-ROD monitoring were described in the *Post-Record of Decision Monitoring for the Test Reactor Area Perched Water System Operable Unit 2-12, Third Annual Technical Memorandum* (Arnett, Meachum, and Jessmore 1996), which presented 3 years of post-ROD monitoring data and included an evaluation of hydrologic and groundwater contaminant conditions for the TRA deep-perched water system and the underlying SRPA. The results from this Technical Memorandum were then incorporated into the *Comprehensive Remedial Investigation/Feasibility Study for the Test Reactor Area Operable Unit 2-13 at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 1997b).

In December 1997, the OU 2-13 ROD was issued (DOE-ID 1997a). According to this ROD, the objectives of the groundwater-monitoring program are to verify contaminant concentration trends in the SRPA, as predicted by computer modeling, and to evaluate the effect that discontinuing discharge to the warm waste pond has had on contaminant concentrations in the SRPA and the deep-perched water system. The *First Five-Year Review Report for the Test Reactor Area, Operable Unit 2-13, at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 2003a), recommended that only four contaminants of concern warranted continued semiannual groundwater monitoring, including chromium, tritium, strontium-90, and cobalt-60. At the recommendation of the Idaho Department of Environmental Quality, samples will be collected for analysis of iodine-129 and technetium-99 during the first round of monitoring following the completion of the 5-year review. During 2002/2003, a deep corehole was drilled south-southwest of the TRA facility and completed as a monitoring well. This well, MIDDLE-1823, has been added to the list of monitoring wells for WAG 2.

1.2 Groundwater Monitoring Plan

The purpose of this GMP is to guide the collection and analysis of groundwater samples to support the OU 2-13 post-ROD monitoring at the TRA. Development of the GMP was based on the recommendations identified from the Waste Area Group (WAG)-2 5-year review (DOE-ID 2003a).

This GMP includes:

- A description of the TRA site and a background discussion
- Development of sampling objectives and needs
- Determination of sample locations and frequency
- Specification of the sample designation to provide for unique identifiers for all samples collected
- Description of sampling procedures and equipment
- Documentation management and sample control requirements.

2. SITE DESCRIPTION AND BACKGROUND

The INEEL is a government-owned reservation managed by the U.S. Department of Energy. The eastern boundary of the INEEL is located 52 km (32 mi) west of Idaho Falls, Idaho. The INEEL site occupies approximately 2,305 km² (890 mi²) of the northwestern portion of the Eastern Snake River Plain in southeast Idaho. The TRA is located in the west-central portion of the INEEL, as shown in Figure 2-1.

The TRA was established in the early 1950s for studying the effects of radiation on materials, fuels, and equipment. Three major reactors have been built at the TRA—(1) the Materials Test Reactor, (2) the Engineering Test Reactor, and (3) the Advanced Test Reactor. Currently, the Advanced Test Reactor is the only operating reactor at the TRA. A detailed description of TRA is available in the Record of Decision (DOE-ID 1997a).

2.1 Source, Nature, and Extent of Contamination

Infiltration of wastewater from the pond system at TRA has caused the migration of contaminants to the deep-perched water system and ultimately to the SRPA. In addition, the TRA disposal well disposed of wastewater from the cold waste sampling pit (TRA-764) into the SRPA until 1982, when the well was taken out of service and turned into a monitoring well. This disposal well was the primary source of chromium contamination in the aquifer since the water in the cooling towers was treated with chromate to inhibit corrosion. The total amount of chromium discharged to the disposal well from January 1, 1964, through December 31, 1972, is approximately 14,121 kg (31,131 lb). According to the *Comprehensive RI/FS for the Idaho Chemical Processing Plant OU 3-13 at the INEEL—Part A, RI/BRA Report (Final)*, the amount of chromium and tritium discharged to the warm waste pond is estimated at 8,070 kg (17,791 lb) and 8,920 Ci, respectively (DOE-ID 1997c).

According to the *Post Record of Decision Monitoring Plan for the Test Reactor Area Perched Water System Operable Unit 2-12* (Dames and Moore 1993), the key contaminants in the groundwater included five radioactive constituents (Am-241, Cs-137, Co-60, Sr-90, and tritium) and eight chemical constituents (arsenic, beryllium, cadmium, chromium, cobalt, fluoride, lead, and manganese). Monitoring for these contaminants was performed from 1993 through 1996.

Following this period of monitoring, the approach to groundwater monitoring at TRA was modified to incorporate results from the previous 3 years of monitoring, recommending changes to the monitoring frequency and analyte list, as identified in the *Third Annual Technical Memorandum* (Arnett, Meachum, and Jessmore 1996). Since January 1997, TRA groundwater monitoring involved semiannual sampling for chromium, cadmium, tritium, cobalt-60, and strontium-90 from the wells identified in the OU 2-12 Groundwater Monitoring Plan (Dames and Moore 1993). These changes to the TRA groundwater monitoring were approved by the Agencies in November 1996 in accordance with written correspondence.

With the completion of the WAG 2 5-Year Review (DOE-ID 2003a), water quality results demonstrated little impact (most levels near detection limits) for Am-241, arsenic, beryllium, cadmium, cesiums-137, fluoride, lead, manganese, and mercury. The contaminants of concern with higher concentrations included chromium, tritium, and strontium-90, with cobalt-60 concentrations being of a concern for the deep-perched water. Based upon the recommendations provided in the review, only these four contaminants of concern continue to warrant continued semiannual groundwater monitoring. In addition, one round of sampling for iodine-129 and technetium-99 will be included at the request of the Agencies.

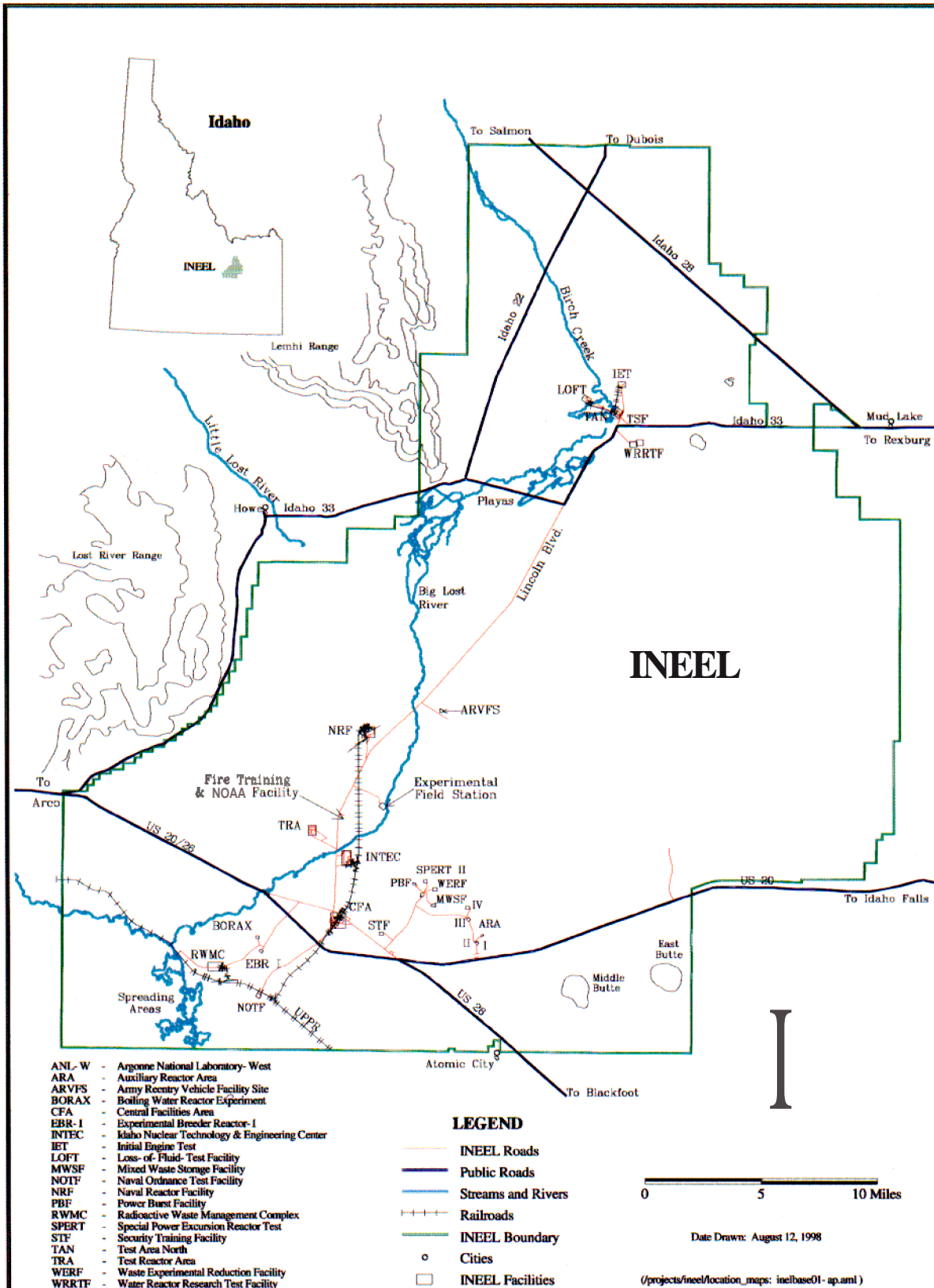


Figure 2-1. Idaho National Engineering and Environmental Laboratory.

3. SAMPLING OBJECTIVES

This section identifies the data needs required for conducting the proposed sampling in support of the WAG 2 groundwater monitoring activities. Data needs and data quality objectives (DQOs) are defined in the following subsections.

3.1 Data Needs

Data needs have been determined through the evaluation of existing data and the projection of data requirements anticipated for analysis of samples collected during WAG 2 groundwater monitoring. Groundwater monitoring was implemented as a component of the OU 2-12 and OU 2-13 RODs (DOE-ID 1992 and 1997a, respectively) to verify trends in the Snake River Plain Aquifer predicted by pre-ROD computer modeling and to ensure that the selected remedies remain protective of the groundwater. Based upon the data evaluation presented in the WAG 2 5-year review (DOE-ID 2003a), it is recommended that biannual monitoring of the perched and aquifer groundwater continue for a reduced list of analytes.

3.1.1 Problem Statement

The objective of DQO Step 1 is to use relevant information to clearly and concisely state the problem to be resolved. There are two basic parts to the problem. First, groundwater-sampling results indicate that INEEL operations at TRA may have impacted the SRPA, causing contaminant concentrations in groundwater that exceed the EPA-defined regulatory levels. Second, it is important to assess the impact that continuing operations at TRA have on the groundwater.

Problem Statement 1—Contaminant Monitoring: Reduce the uncertainties associated with whether contaminant concentrations in the aquifer underlying TRA exceed the EPA-defined regulatory levels.

Problem Statement 2—Operations Impact: Assess the impact that continuing operations at TRA have on the groundwater through monitoring of the perched water systems underlying TRA.

3.1.2 Decision Identification

The goal of DQO Step 2 is to define the questions that the study will attempt to resolve and to identify the alternative actions that may be taken based on the outcome of the study. The defined questions and their corresponding alternative actions will then be joined to form decision statements. The principal study questions (PSQs) for WAG 2 groundwater monitoring are as follows:

- PSQ #1—Do the contaminant concentrations present in the SRPA underlying the TRA site exceed the EPA-defined regulatory levels and Idaho groundwater quality standards (EPA 2002; IDAPA 58.01.11.200)?
- PSQ #2—Do the trends of the contaminant concentrations present in the perched water underlying the TRA site indicate that continuing operations are having an adverse impact on groundwater?

Alternative actions are those actions resulting from resolution of the stated PSQs. The types of alternative actions considered would depend on the answers to the PSQs. Given the PSQs developed for WAG 2 groundwater monitoring, the associated decision statements (DSs) are as follows:

- DS #1—Determine whether contaminant concentrations present in the SRPA underlying the TRA site exceed the EPA-defined regulatory levels and Idaho groundwater quality standards (EPA 2002; IDAPA 58.01.11.200).
- DS#2—Determine whether the trends of contaminant concentrations in the perched water underlying the TRA site indicate that continuing operations are having an adverse impact on the groundwater.

3.1.3 Identify Inputs to the Decision

The purpose of DQO Step 3 is to identify the type of data needed to resolve each of the decision statements identified in DQO Step 2. These data may already exist or may be derived from computational or surveying/sampling and analysis methods. Analytical performance requirements (e.g., practical quantitation limits [PQLs], precision, and accuracy) also are provided in this step for any new data that will be collected.

3.1.3.1 Information Required to Resolve Decision Statements. Table 3-1 specifies the information (data) required to resolve each of the decision statements identified in Section 3.1.2 and identifies whether these data already exist. For the data that are identified as existing, the source references for the data have been provided with a qualitative assessment as to whether the data are of sufficient quality to resolve the corresponding decision statement. The qualitative assessment of the existing data was based on the evaluation of the corresponding quality control (QC) data (e.g., spikes, duplicates, and blanks), detection limits, data collection methods, etc.

Table 3-1. Required information and reference sources.

DS #	Measurement Variable	Required Data	Do Data Exist?	Source Reference	Sufficient Quality?	Additional Information Required?
1	Radiochemical and chemical concentrations	Laboratory measurement of potential contaminants	Yes	5-Year Review*	No	Yes
2	Radiochemical and chemical concentrations	Laboratory measurement of potential contaminants	Yes	5-Year Review	No	Yes

DS = decision statement

*5-Year Review (DOE-ID 2003a)

3.1.3.2 Basis for Setting the Action Level. The action level is the threshold value that provides the criterion for choosing between alternative actions. For Decision Statements 1 and 2, the contaminants of concern as identified in the WAG 2 5-year review (DOE-ID 2003a) are chromium, strontium-90, cobalt-60, and tritium. The bases for setting the action levels for the contaminants are the EPA-defined

regulatory levels (e.g., drinking water standards) and the Idaho groundwater quality standards. The numerical values for the action levels are provided in DQO Step 5.

3.7.3.3 Computational and Survey/Analytical Methods. Table 3-2 identifies the decision statements where existing data either do not exist or are of insufficient quality to resolve the decision statements. For these decision statements, Table 3-2 presents computational and/or surveying/sampling methods that could be used to obtain the required data. For Decision Statements 1 and 2, analytical data will be collected to determine the concentrations of contaminants in the perched water and SRPA underlying WAG 2. For Decision Statement 2, the statistical trend of the contaminants will be determined to ascertain whether the potential exists for adversely affecting the SRPA in the future.

Table 3-2. Information required for resolution of decision statements.

DS #	Measurement Variable	Required Data	Computational Methods	Survey/Analytical Methods
1	Radiochemical and chemical	Radiochemical and chemical concentrations in the SRPA	Compare contaminant concentrations to regulatory levels	Analytical laboratory determination of contaminant concentrations in groundwater
2	Radiochemical and chemical	Radiochemical and chemical concentrations in the perched water	Obtain statistical trend of contaminant concentrations over time	Analytical laboratory determination of contaminant concentrations in groundwater

DS = decision statement

3.1.3.4 Analytical Performance Requirements. Table 3-3 defines the analytical performance requirements for the data that need to be collected to resolve each of the decision statements. These performance requirements include the practical quantitation limit (PQL), precision, and accuracy requirements for each of the potential contaminants.

Table 3-3. Analytical performance requirements.

DS #	Analyte List	Survey/Analytical Method	Preliminary Action Level	PQL	Precision Requirement	Accuracy Requirement
1, 2	Chromium Strontium-90 Cobalt-60 Tritium Iodine-129" Technetium-99"	SW-846* GFPC Gamma spec. LSC X-ray spec. GFPC	EPA and IDAPA regulatory levels	See QAPjP	± 20%	80–120

a. These contaminants Will be analyzed for one round only following the completion of the WAG 2 5-year review

DS = decision statement

EPA = U.S. Environmental Protection Agency

GFPC = gas-flow proportional counting

IDAPA = Idaho Administrative Procedures Act

LSC = liquid scintillation counting

PQL = practical quantitation limit

QAPjP = Quality Assurance Project Plan

*See Reference EPA 1998.

3.1.4 Study Boundaries

The primary objective of DQO Step 4 is to identify the population of interest, define the spatial and temporal boundaries that apply to each decision statement, define the scale of decision-making, and identify any practical constraints (hindrances or obstacles) that must be taken into consideration in the sampling design. Implementing this step ensures that the sampling design will result in the collection of data that accurately reflect the true condition of the site under investigation.

3.1.4.1 Geographic Boundaries. Limiting the geographic boundaries of the study area ensures that the investigation does not expand beyond the original scope of the task. This study will focus on the perched water and SRPA beneath TRA. Based on review of the hydraulic data and groundwater contour maps, the selected wells will allow for evaluation of the potential migration of groundwater contaminants.

3.1.4.2 Temporal Boundaries. The temporal boundary refers to the timeframe to which each decision statement applies (e.g., number of years) and when (e.g., season, time of day, and weather conditions) the data should optimally be collected. Temporal boundaries are important when contaminant concentration changes over time are significant. Though historical data collected at TRA and other sites at the INEEL indicate that contaminant concentrations are unaffected by seasonal factors, the WAG 2 groundwater-monitoring samples will be collected at approximately the same time of year (i.e., October and March timeframes). This will be done in an effort to assess any impact on the data collected from changes in groundwater levels because of snow melt and run-off. Samples will be collected semiannually at least until the second 5-year review. At that time, groundwater monitoring data will be reviewed with the Agencies, and a determination will be made as to whether the data warrant continuation of the semiannual sampling, or if a change in the frequency or list of analytes is necessary. Given that sufficient data are collected to demonstrate that contaminant levels are constant or decreasing and that no other contaminants pose a potential threat to the groundwater, the monitoring requirements may be modified.

3.7.4.3 Scale of Decision-Making. The scale of decision-making is defined by joining the population of interest and the geographic and temporal boundaries of the area under investigation. For the WAG 2 groundwater monitoring, the scale of decision-making is the same as the geographic boundary defined in Section 3.1.4.1.

3.1.4.4 Practical Constraints. Practical constraints may include physical barriers, difficult sample matrices, high radiation areas, or any other condition that will need to be taken into consideration in the design and scheduling of the sampling program. For WAG 2 groundwater monitoring, the primary constraint to be considered is whether water is present in the selected perched water wells. Historically, a number of the perched wells listed have been dry. Given the reduced volumes of water being discharged into the Cold Waste Pond at TRA, the dry wells are anticipated to continue.

3.1.5 Develop a Decision Rule

The purpose of DQO Step 5 initially is to define the statistical parameter of interest (i.e., mean, 95% upper confidence level) that will be used for comparison against the action level. The two decision rules corresponding to the two decision statements provided in Section 3.1.2 are as follows:

- DR #1—If the concentration for an SRPA well sample exceeds the defined regulatory level for a given contaminant, the appropriate notifications will be made to the Agencies with monitoring continuing until the second 5-year review.
- DR #2—If the statistical trend for a contaminant in any of the perched water wells indicates that concentrations are increasing, then monitoring may be continued after the second 5-year review, as

determined by concurrence with the Agencies. At that time, it may be determined whether more aggressive action may be necessary. Conversely, if the trend indicates that contaminant concentrations are decreasing, then the monitoring frequency for frequency and target analytes may be modified.

These decision rules summarize the attributes the decision-maker needs to know about the sample population and how this knowledge will guide the selection of a course of action to solve the problem

3.1.6 Decision Error Limits

Because analytical data can only estimate the true condition of the site under investigation, decisions that are made based on measurement data could potentially be in error (i.e., decision error). For this reason, the primary objective of DQO Step 6 is to determine which decision statements (if any) require a statistically-based sample design. The purpose of determining the decision error limits is to specify the decision-maker's tolerable limits on decision errors, which are used to establish performance goals for the data collection design.

Tolerable error limits assist in the development of sampling designs to ensure that the spatial variability and sampling frequency are within specified limits. However, the sampling design for the WAG 2 groundwater monitoring is determined by the current monitoring wells' locations. The selection of these wells is based on professional judgment rather than statistics. Therefore, error limits are not used to determine sampling locations or frequency.

For the decision statement to be resolved using a nonstatistical design (i.e., Decision Statement 1), there is no need to define the "gray region" or the tolerable limits on the decision error, since these only apply to statistical designs. While a statistical sampling design is not applicable to trend analysis as required for resolution of Decision Statement 2, a level of significance needs to be established over which it can be determined whether a significant trend does exist. For WAG 2 groundwater monitoring, a 95% significance level will be used to determine whether a trend in the data exists. Given the level of significance, the following null hypothesis was developed:

Null Hypothesis — A significant positive trend in the data exists.

3.1.7 Optimize the Design

The objective of DQO Step 7 is to present alternative data collection designs that meet the minimum data quality requirements, as specified in DQO Steps 1 through 6. A selection process is then used to identify the most resource-effective data collection design that satisfies all of the data quality requirements.

The following subsections present the selected technology and sampling methods for resolving each decision statement, along with a summary of the proposed implementation design. The basis for the selected implementation design is also provided.

3.1.7.1 Groundwater Monitoring. Monitoring will be performed from groundwater-monitoring wells on an annual basis. Samples will be sent to off-Site laboratories for analysis with full quality assurance/quality control protocols. Field measurements will be used to determine groundwater elevations. Monitoring will be continued as a minimum up to the time of the second 5-year review scheduled for the fall of 2007.

3.1.7.2 Trend Analysis. Various statistical tests exist to determine whether a significant temporal trend exists in a given data set. For simple linear regression, the statistical test of whether the slope is significantly different from zero is equivalent to testing if the correlation coefficient is significantly different from zero. To perform the test, the correlation coefficient is first calculated (Equation 3-1). This correlation coefficient is then used to calculate the t-statistic (Equation 3-2), which is then compared to the critical value for $t_{1-\alpha/2}$ to determine whether there is a significant correlation between the two variables (in this case, an analyte's concentration versus time). Historical and current data sets will be combined to perform the trend analysis.

$$r = \frac{\sum_{i=1}^n X_i Y_i - \frac{\sum_{i=1}^n X_i \sum_{i=1}^n Y_i}{n}}{\left(\left(\sum_{i=1}^n X_i^2 - \frac{\left(\sum_{i=1}^n X_i \right)^2}{n} \right) \left(\sum_{i=1}^n Y_i^2 - \frac{\left(\sum_{i=1}^n Y_i \right)^2}{n} \right) \right)^{1/2}} \quad (3-1)$$

where

r = correlation coefficient for a given analyte

X_i = the year of sample collection

Y_i = individual concentrations for a given analyte.

$$t = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}} \quad (3-2)$$

where

t = the calculated t-test statistic

r = correlation coefficient for a given analyte calculated in Equation 3-1

n = the number of data points.

If the calculated t is greater than $t_{n-2, 1-\alpha}$ as obtained from a table of statistical t-values, then the null hypothesis is rejected, and it can be concluded that there is no significant positive statistical trend in the data. Conversely, if the calculated t is less than $t_{n-2, 1-\alpha}$ as obtained from a table of statistical t-values, then the null hypothesis is not rejected, and it can be concluded that there is a significant positive statistical trend in the data.

3.2 Quality Assurance Objectives for Measurement

The quality assurance (QA) objectives for measurement will meet or surpass the minimum requirements for data quality indicators established in the QAPjP (DOE-ID 2002). This reference provides minimum requirements for the following measurement quality indicators: precision, accuracy, representativeness, completeness, and comparability. Precision, accuracy, and completeness will be calculated per the QAPjP (DOE-ID 2002).

3.2.1 Precision

Precision is a measure of the reproducibility of measurements under a given set of conditions. In the field, precision is affected by sample collection procedures and by the natural heterogeneity encountered in the environment. Overall precision (field and laboratory) can be evaluated by the use of duplicate samples collected in the field. Greater precision is typically required for analytes with very low action levels that are close to background concentrations.

Laboratory precision will be based upon the use of laboratory-generated duplicate samples or matrix spike/matrix spike duplicate samples. Evaluation of laboratory precision will be performed during the method data validation process.

Field precision will be based upon the analysis of collected field duplicate or split samples. For samples collected for laboratory analyses, a field duplicate will be collected at a minimum frequency of one in 20 environmental samples.

3.2.2 Accuracy

Accuracy is a measure of bias in a measurement system. Laboratory accuracy is demonstrated using laboratory control samples, blind QC samples, and matrix spikes. Evaluation of laboratory accuracy will be performed during the method data validation process. Sample handling, field contamination, and the sample matrix in the field affect overall accuracy. By evaluating results from field blanks, trip blanks, and equipment rinsates, false positive or high-biased sample results will be assessed.

Field accuracy will only be determined for samples collected for laboratory analysis. The field screening instrumentation can only analyze the soils and is not set up for the analysis of water samples. Therefore, accuracy of field instrumentation will be ensured through the use of appropriate calibration procedures and standards.

3.2.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which the sampling and analysis data accurately and precisely represent the characteristic of a population parameter being measured at a given sampling point or for a process or environmental condition. Representativeness will be evaluated by determining whether measurements are made and physical samples are collected in such a manner that the resulting data appropriately measure the media and phenomenon studied. The comparison of all field and laboratory analytical data sets obtained throughout this remedial action will be used to ensure representativeness.

3.2.4 Detection Limits

Detection limits will meet or exceed the risk-based or decision-based concentrations for the contaminants of concern. Detection limits will be as specified in the Sample and Analysis Management

(formerly the Sample Management Office) Laboratory Master Task Agreement Statements of Work, Task Order Statements of Work, and as described in the QAPjP (DOE-ID 2002).

3.2.5 Completeness

Completeness is a measure of the quantity of usable data collected during the field sampling activities. The QAPjP (DOE-ID 2002) requires that an overall completeness goal of 90% be achieved for noncritical samples. If critical parameters or samples are identified, a 100% completeness goal is specified. Critical data points are those sample locations or parameters for which valid data must be obtained in order for the sampling event to be considered complete. Given that this is a monitoring project, all field screening and laboratory data will be considered noncritical with a completeness goal of 90%.

3.2.6 Comparability

Comparability is a qualitative characteristic that refers to the confidence with which one data set can be compared to another. At a minimum, comparable data must be obtained using unbiased sampling designs. If sampling designs are not unbiased, the reasons for selecting another design should be well documented. Data comparability will be assessed through the comparison of all data sets collected during this study for the following parameters:

- Data sets will contain the same variables of interest.
- Units will be expressed in common metrics.
- Similar analytical procedures and quality assurance (QA) will be used to collect data.
- Time of measurements of variables will be similar.
- Measuring devices will have similar detection limits.
- Samples within data sets will be selected in a similar manner.
- The number of observations will be of the same order of magnitude

3.2.7 Data Validation

Method data validation is the process whereby analytical data are reviewed against set criteria to ensure that the results conform to the requirements of the analytical method and any other specified requirements.

All laboratory-generated analytical data will be validated to Level “B” per INEEL Guide (GDE) -7003, “Levels of Analytical Method Data Validation.” Field-generated data will not be validated. Quality of the field-generated data will be ensured through adherence to established operating procedures and use of equipment calibration, as appropriate.

4. SAMPLING LOCATION AND FREQUENCY

The material presented in this section is intended to support the DQOs summarized in Section 3.

4.1 Quality Assurance/Quality Control Samples

The QA samples will be included to satisfy QA requirements for the field operations per the QAPjP (DOE-ID 2002). The duplicate, blank, and calibration quality assurance/quality control (QA/QC) samples will be analyzed as outlined in Section 3.

4.2 Sampling Locations

The wells selected for the OU 2-13 post-ROD monitoring and the rationale for inclusion in the monitoring network are described in Section 3. Table 4-1 provides the necessary well construction information (date drilled, total depth, screen interval, casing diameter, etc.), and purge volume requirements for the wells to be monitored. Figure 4-1 shows the locations of the wells relative to the TRA facility.

4.3 Sampling Frequency

Based on the recommendation provided in the *First Five-Year Review Report for the Test Reactor Area, Operable Unit 2-13, at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 2003a), only four contaminants of concern warrant continued semiannual groundwater monitoring including chromium, tritium, strontium-90, and cobalt-60. The Idaho Department of Environmental Quality also recommended the collection of samples for iodine-129 and technetium-99 analysis. Sampling will occur on a biannual basis for all analytes with the exception of iodine-129 and technetium-99. Samples for these two analytes will be collected only during the first round of monitoring performed following completion of the 5-year review.

During recent sampling events, three of the USGS perched wells (USGS-53, USGS-55, and USGS-56) have not had any water present. In the event that these wells are dry, the following wells shall be sampled in their place:

- For USGS 53, substitute either PW-9 or USGS-73.
- For USGS-55, substitute USGS-70.
- For USGS-56, substitute USGS-68.

Table 4-1. Well construction information

Well	Date Installed	Total Depth (ft)	Well Scream Open Hole	Screened Interval(s) (ft bls)	Pump	Casing Diameter (in.)	Depth to Water ^a (ft bls)	Estimated Purge Volume ^b (gal)
PW-11	1990	134.5	Stainless-steel well screen	109 to 129	Submersible	4 ^c	104.4	59 to 98
PW-12	1990	133	Stainless-steel well screen	108 to 128	Submersible	4 ^c	82.0	100 to 166
PW-14	1990	126	Stainless-steel well screen	93 to 123	Submersible	4 ^c	98.2	49 to 82
USGS-53	1960	90	Perforated steel casing	50 to 67 75 to 80	Submersible	4 ^c	72.7	76 to 127
USGS-54	1960	91	Open hole	60 to 91	Submersible	6	75.0	71 to 118
USGS-55	1960	81	Open hole	45 to 80	Submersible	6	72.5	37 to 62
USGS-56	1960	80	Open hole	59 to 80	Submersible	6	71.5	37 to 62
Hwy-3	1967	750	Open hole	680 to 750	Submersible	8	538.8	1,644
TU - 06	1990	562	Stainless-steel well screen	528 to 558	Submersible	4 ^c	470.1	180 to 300
TU - 07	1990	501	Stainless-steel well screen	463 to 493	Submersible	4 ^c	474.3	52 to 87
TU - 08	1990	501.5	Stainless-steel well screen	471.5 to 501.5	Submersible	4 ^c	478.9	44 to 74
USGS-58	1961	503	Open hole	218 to 473	Submersible	6	464.1	172 to 286
USGS-65	1960	498	Open hole	456 to 498	Submersible	6	468.9	128 to 214
MIDDLE-1823	2003	729.7	Stainless-steel well screen	680 to 720	Submersible	6	482.6	978 to 1,630

a. Water-level measurement is from the Third Annual Technical Memorandum (Arnett, Meachum, and Jessmore 1996).

b. Purge volumes indicated on table include calculations for both three and five well-bore volumes.

c. Inside diameter

bls = below land surface

TRA = Test Reactor Area

USGS = United States Geological Survey

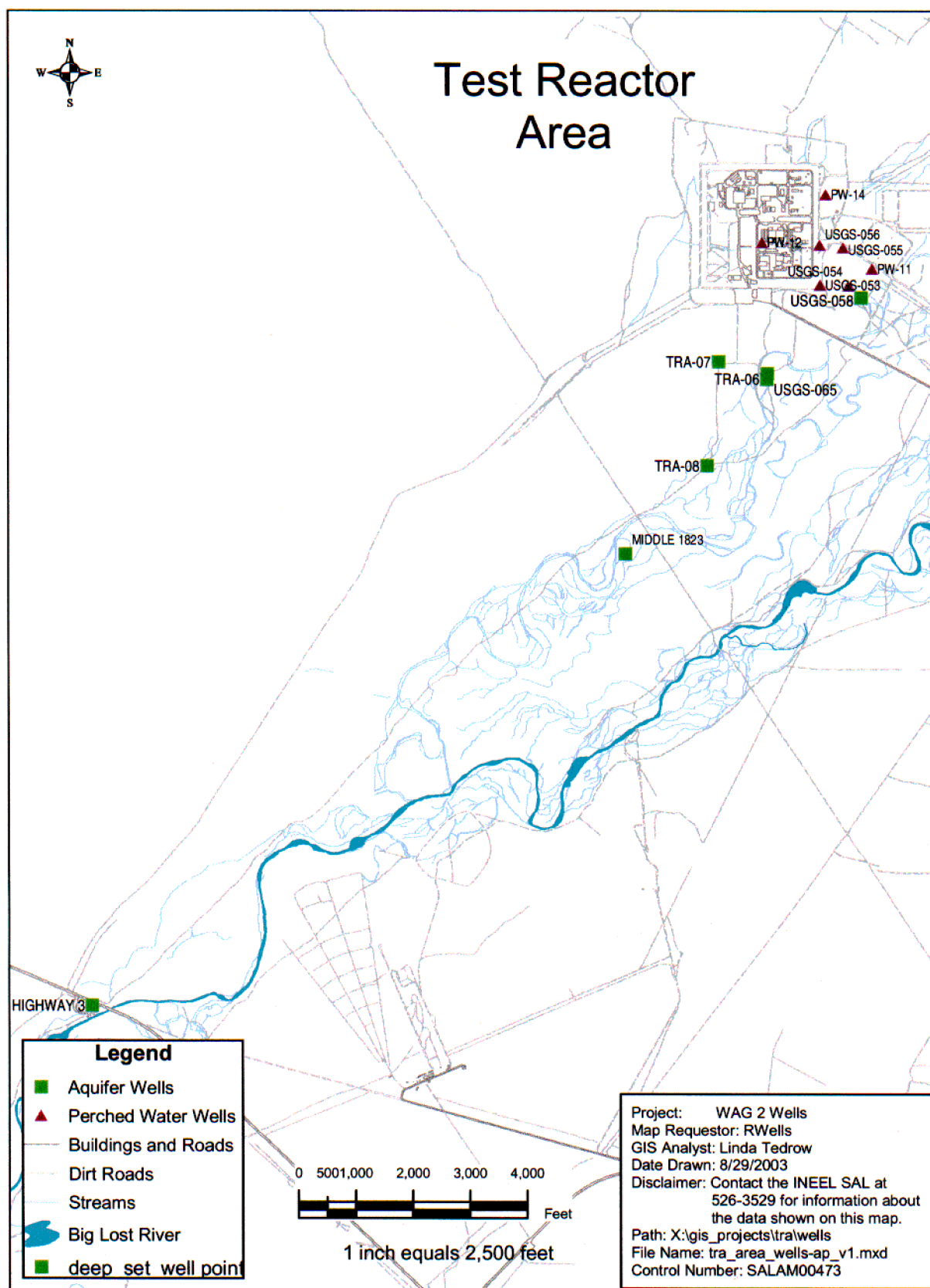


Figure 4-1. Well locations.

5. SAMPLING DESIGNATION

5.1 Sample Identification Code

A systematic character identification (ID) code will be used to uniquely identify all samples. Uniqueness is required for maintaining consistency and preventing the same ID code from being assigned to more than one sample.

The first three designators of the code (**TRA**) refer to the sample originating from the Test Reactor Area. The next three numbers designate the sequential sample number for the project. The seventh and eighth characters represent a two-character set (i.e., 01, 02) for designation of field duplicate samples. The last two characters refer to a particular analysis and bottle type. Refer to the Sampling and Analysis Plan (SAP) tables in Appendix A for specific bottle code designations.

For example, a groundwater sample collected in support of the post-ROD monitoring might be designated as TRA00101R4, where (from left to right):

- TRA designates the sample as being collected from the Test Reactor Area
- 001 designates the sequential sample number
- 01 designates the type of sample (01 = original, 02 = field duplicate)
- R4 designates gamma spectrometric analysis.

An SAP table/database will be used to record all pertinent information (well designation, media, date, etc.) associated with each sample ID code. The SAP tables for the Waste Area Group (WAG)-2 post-ROD monitoring are presented in Appendix A.

5.2 Sampling and Analysis Plan Table/Database

5.2.1 Sampling and Analysis Plan Table

An SAP table format was developed to simplify the presentation of the sampling scheme for project personnel. The following sections describe the information recorded in the SAP table/database, which is presented in Appendix A.

5.2.2 Sample Description

The sample description fields contain information relating to individual sample characteristics.

5.2.2.1 Sampling Activity. The sampling activity field contains the first six characters of the assigned sample number. The sample number in its entirety will be used to link information from other sources (field data, analytical data, etc.) to the information in the SAP table for data reporting, sample tracking, and completeness reporting. The analytical laboratory will also use the sample number to track and report analytical results.

5.2.2.2 Sample Type. Data in this field will be selected from the following:

REG	for a regular sample
QC	for a QC sample.

5.2.2.3 Media. Data in this field will be selected from the following:

GW	for groundwater samples
WATER	for QA/QC water samples.

5.2.2.4 Collection Type. Data in this field will be selected from the following:

GRAB	for grab sample collection
RNST	for rinsate QA/QC samples
DUP	for field duplicate samples
FBLK	for field blank QA/QC samples
TBLK	for trip blank QA/QC samples

5.2.2.5 Planned Date. This date is related to the planned sample collection start date.

5.2.3 Sample Location Fields

This group of fields pinpoints the exact location for the sample in three-dimensional space starting with the general AREA, narrowing the focus to an exact location geographically, and then specifying the DEPTH in the depth field.

5.2.3.1 Area. The AREA field identifies the general sample collection area. This field should contain the standard identifier for the INEEL area being sampled. For this investigation, samples are being collected from the Auxiliary Reactor Area (ARA) and Power Burst Facility (PBF) sites, and the AREA field identifier will correspond to one of those two sites.

5.2.3.2 Location. The LOCATION field may contain geographical coordinates, x-y coordinates, building numbers, or other location-identifying details, as well as program-specific information such as borehole or well number. Data in this field will normally be subordinated to the AREA. This information is included on the labels generated by Sample and Analysis Management (formerly the Sample Management Office) to aid sampling personnel.

5.2.3.3 Type of Location. The TYPE OF LOCATION field supplies descriptive information concerning the exact sample location. Information in this field may overlap that in the location field, but it is intended to add detail to the location.

5.2.3.4 Depth. The DEPTH of a sample location is the distance in feet from surface level or a range in feet from the surface.

5.2.4 Analysis Types

5.2.4.1 AT1–AT20. These fields indicate analysis types (radiological, chemical, hydrological, etc.). Space is provided at the bottom of the form to clearly identify each type. A standard abbreviation will also be provided, if possible.

6. SAMPLING PROCEDURES AND EQUIPMENT

This section describes the sampling procedures and equipment to be used for the planned groundwater monitoring. A presampling meeting will be held before commencement of any sampling activities to review the requirements of the GMP and the Health and Safety Plan (HASp) (Gurney 2003), and to ensure that all supporting documentation has been completed.

6.1 Groundwater Monitoring

6.1.1 Groundwater Elevations

Groundwater elevations will be measured using either an electronic measuring tape (Solinst brand or equivalent) or a steel tape measure, as described in GDE-128, "Measuring Groundwater Levels." Measurement of all groundwater levels will be recorded to an accuracy of 0.01 ft. The use of automated data loggers for measuring groundwater levels will be implemented as funding becomes available.

6.1.2 Well Purging

All wells, except Hwy-3, will be purged before sample collection. During the purging operation, a Hydrolab (or equivalent) will be used to measure specific conductance, pH, and temperature. Well-purging procedures are provided in GDE-127, "Sampling Groundwater." A sample for water quality analysis can be collected after a minimum of three well-casing volumes of water has been purged from the well and when three consecutive water-quality parameters are within the following limits:

- pH: ± 0.1
- Temperature: $\pm 0.5^{\circ}\text{C}$
- Specific conductance: $\pm 10\ \mu\text{mhos/cm}$.

6.1.3 Groundwater Sampling

Before sampling, all nondedicated sampling equipment that is exposed to the water sample will be cleaned following the procedure outlined in Technical Procedure (TPR) -6575, "Decontaminating Sampling Equipment in the Field." Following sampling, all nondedicated equipment that was exposed to the well water will be decontaminated in accordance with TPR-6575 before storage. An exception to TPR-6575 is that the isopropanol steps for decontamination will be omitted.

The water level in each well will be measured before purging. Then, the well will be purged a minimum of three well-casing volumes until the pH, temperature, and specific conductance of the purge water have stabilized, or until a maximum of 5 well-casing volumes have been removed. If the well goes dry before purging 3 well-bore volumes, purging will be considered complete and samples collected thereafter. If parameters are still not stable after five volumes have been removed, samples will be collected and appropriate notations will be recorded in the logbook.

Groundwater samples will be collected for the analyses defined in Section 3. The requirements for containers, preservation methods, sample volumes, and holding times are provided in Table 6-1.

Table 6-1. Specific sample requirements—groundwater samples.

Analytical Parameter	Container		Preservative	Holding Time
	Size ^a	Type		
Chromium (filtered and unfiltered)	1 L	HDPE ^c	pH <2 with HNO ₃	6 months
Tritium	125 mL	Glass	None	6 months
Strontium-90	1 L	HDPE	pH <2 with HNO ₃	6 months
Gamma-emitting radionuclides	1 L	HDPE	pH <2 with HNO ₃	6 months
Iodine-129 ^b	8 L	HDPE	None	28 days
Technetium-99 ^b	1 L	HDPE	pH <2 with HNO ₃	6 months

a. Size may change depending on laboratory. Refer to field guidance forms before sampling

b. Samples Will be collected for this analyte for one round only following completion of the WAG 2 5-year review.

c. HDPE – high-density polyethylene

Sample bottles for groundwater samples will be filled to approximately 90 to 95% of capacity to allow for content expansion or preservation. Samples to be analyzed for metals will be both unfiltered and filtered through a 0.45-µm filter. Samples requiring acidification will be acidified to a pH <2 using ultra pure nitric acid. The preferred order for sample collection is:

- Temperature, pH, specific conductance, and dissolved oxygen (during purging)
- Chromium (filtered and unfiltered)
- Radionuclides (unfiltered).

6.1.4 Shipping Screening

All samples destined for off-Site laboratory analysis will be submitted to the Radiation Measurements Laboratory located at TRA for a 20-minute gamma screen prior to shipment. Gamma screening can be performed using the same sample as that obtained for gamma spectroscopic analysis, provided that the sample is in the proper container. For those wells where the radionuclide contamination is fairly well characterized or nonexistent, radiological control screening methods will suffice for shipping.

6.2 Handling and Disposition of Remediation-Derived Waste

Remediation-derived Comprehensive Environmental Response, Compensation, and Liability Act waste will be generated at OU 2-13 as a result of the groundwater-monitoring activities described herein. The disposition and handling of waste for this project will be consistent with the *Waste Certification Plan for the Environmental Restoration Program* (Jones 1997). Samples will be handled in accordance with Program Requirements Document (PRD)-5030, “Environmental Requirements for Facilities, Processes, Materials, and Equipment”, and MCP-3480, “Environmental Instructions for Facilities, Processes, Materials, and Equipment”, and disposed of by the subcontracted laboratory following analysis. All waste streams generated from the sampling activity will be characterized in accordance with MCP-62, “Waste Generator Services – Low-Level Waste Management”, and will be handled, stored, and disposed of

accordingly. Remediation-derived waste will be stored in a designated, controlled area inside the TRA facility. Solid waste will include material such as personal protective equipment (PPE), purged water, paper, packaging, and towels generated during sample preparation and packaging. The solid waste will be disposed of as low-level waste only.

Waste will be generated as a result of the sampling activities conducted during this project. Anticipated wastes include the following:

- Personal protective equipment (PPE)
- Purge water
- Liquid decontamination residue
- Solid decontamination residue
- Plastic sheeting
- Unused/unaltered sample material
- Sample containers
- Miscellaneous wastes
- Contaminated equipment.

Wastes may be hazardous. As sampling continues, additional waste streams may be identified. All new waste streams, as well as those identified above, are required to have the waste identified and characterized. A hazardous waste determination must be completed and presented to the appropriate waste management organization (e.g., Waste Generator Services [WGS]) for approval by that organization at the time of generation.

The wastes associated with the sampling activities will be managed in a manner that complies with the established applicable or relevant and appropriate requirements (ARARs), protects human health and the environment, and achieves minimization of remediation waste to the extent possible. The ARARs applicable to the storage of wastes are defined in accordance with the ROD. The basic provisions of the ARARs provide for appropriate waste containerization and compliant storage of the remediation wastes for an interim storage period. Protection of human health and the environment is achieved through implementation of the ARARs and through implementation of the waste management approach described herein.

6.2.1 Waste Minimization

Waste minimization techniques will be incorporated into planning and daily work practices to improve worker safety and efficiency. In addition, such techniques will aid in reducing the project environmental and financial liability. Specific waste minimization practices to be implemented during the project will include, but not be limited to, the following:

- Excluding materials that could become hazardous wastes in the decontamination process (if any)
- Controlling transfer between clean and contaminated zones

- Designing containment such that contamination spread is minimized
- Collecting all samples necessary at one time, such that additional wastes are not generated due to resampling.

The *U.S. Department of Energy Idaho Operations Office Idaho National Engineering and Environmental Laboratory Interim Pollution Prevention Plan* (DOE-ID 2000) addresses the efforts to be expended and the reports required to track waste generated by projects. This plan directs that the volume of waste generated by INEEL operations will be reduced as much as possible.

Industrial wastes do not require segregation by type; therefore, containers will be identified as industrial waste and will be maintained outside the controlled area for separate collection. Contaminated waste has the potential to be hazardous. This waste will require segregation as either incinerable (e.g., wipes and PPE) or nonincinerable (e.g., polyvinyl tubing), in anticipation of subsequent waste management. Containers for collection of contaminated waste will be clearly labeled to identify waste type and will be maintained inside the controlled area as defined in the project HASP (INEEL 2003), until removal for subsequent management.

6.2.2 Laboratory Samples

All laboratory and sample waste will be managed in accordance with the Sample and Analysis Management (formerly the Sample Management Office) master task agreements as part of the contract for the subcontracted laboratory. The laboratory will dispose of any unused sample material. The laboratories are responsible for any waste generated as a result of analyzing the samples. In the event that unused sample material must be returned from the laboratory, only the unused, unaltered samples in the original sample containers will be accepted from the laboratory. These samples will be returned to the waste stream from which they originated. If the laboratory must return altered sample material (e.g., analytical residue), the laboratory will specifically define the types of chemical additives used in the analytical process and assist in making a hazardous waste determination. This information will be provided to the project field team leader (FTL) and environmental compliance coordinator. Management of this waste will also require separation from the other unaltered samples being returned.

6.2.3 Packaging and Labeling

Containers used to store and transport hazardous waste must meet the requirements of 40 *Code of Federal Regulations* (CFR) 264, Subpart I, "Use and Management of Containers." The *Idaho National Engineering and Environmental Laboratory Waste Acceptance Criteria* (DOE-ID 2003b), hereinafter referred to as the INEEL Waste Acceptance Criteria (WAC), contains additional details concerning packaging and container conditions. Appropriate containers for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste include 208-L (55-gal) drums and other suitable containers that meet U.S. Department of Transportation (DOT) regulations on packaging (49 CFR 171, 173, 178, and 179) or INEEL WAC Sections 4.4, 4.5, and 4.6 (DOE-ID 2003b). Waste Generator Services (WGS) will be consulted to ensure that the packaging is acceptable to the receiving facility.

Waste containers will be labeled with standard hazardous waste labels. The following information will be included on the labels:

- Unique bar code serial number
- Name of generating facility

- Phone number of generator contact
- Listed or characteristic waste code(s)
- Waste package gross weight
- Maximum radiation level on contact and at 1 m (3 ft) in the air
- Waste stream or material identification number, as assigned by the receiving facility
- Prior to shipping, other labels and markings as required by 49 CFR 172, Subparts D and E.

Any of the above information that is not known when the waste is labeled may be added when the information is known.

The unique bar code serial number is used for tracking and consists of a five-digit number followed by a single alpha designator. The alpha designator indicates which facility generated the bar code. Presently, only the Waste Reduction Operations Complex (WROC) generates the bar codes and their alpha designator is "K." These bar codes will be furnished by WROC in lots of 50. A new bar code will be affixed to each container when waste is first placed in the container.

Any waste shipped off the INEEL from Waste Area Group (WAG)-2 must be labeled in accordance with applicable DOT labels and markings (49 CFR 172). In addition, waste labels must be visible, legibly printed or stenciled, and placed so that a full set of labels and markings are visible. See Sections 4.4, 4.5, or 4.6 of the INEEL WAC (DOE-ID 2003b) for additional labeling information.

6.2.4 Storage and Inspection

Wastes may be stored in the CERCLA waste storage unit (CWSU), already established at TRA. Solid wastes, segregated as potentially hazardous and/or mixed and placed in 208-L (55-gal) drums, will be stored in the CWSU. If required due to space limitations, a new CERCLA storage area (CSA) may need to be established as the sampling progresses. Determination of the CSA location will be coordinated with and approved by the appropriate TRA personnel. Wastes placed in wooden storage boxes (1.2 x 1.2 x 2.4 m [4 x 4 x 8 ft] and 0.6 x 1.2 x 2.4 m [2 x 4 x 8 ft]), or other suitable containers, will be stored outside in a roped off area that will be maintained as a CSA. Waste segregated as low-level radioactive only (e.g., soils) will be stored in a radioactive materials area near the CSA. The radioactive materials area will be established at the same time as the CSA.

To meet the substantive requirements of 40 CFR 264, Subpart I, the Resource Conservation and Recovery Act (RCRA) ARARs inspection of the CWSU and/or CSA will be conducted as part of the weekly waste container inspection. The purposes of the weekly container inspection are to look for containers that are leaking and/or that are deteriorating due to corrosion or other factors, to ensure that the containment system has not deteriorated due to corrosion, and to verify that labels are in place and legible. Inspections of the containers and the CWSU/CSA are conducted to meet the guidance contained in MCP-3475, "Temporary Storage of CERCLA-Generated Waste at the INEEL." The inspections will be documented on a weekly inspection form when completed. The checklists used to guide the inspection will be maintained in the CWSU/CSA.

6.2.5 Personal Protective Equipment

The PPE requiring disposal may include, but not be limited to, the following: gloves, respirator cartridges, shoe covers, and coveralls. The PPE will be disposed of in accordance with the requirements set forth in the INEEL WAC (DOE-ID 2003b) and the *Waste Certification Plan for the Environmental Restoration Program* (Jones 1997).

6.2.6 Hazardous Waste Determinations

All wastes generated will be characterized as required by 40 CFR 262.11. Hazardous waste determinations will be prepared for all waste streams per the requirements set forth in MCP-62, “Waste Generator Services—Low-Level Waste Management.” Completed hazardous waste determinations will be maintained for all waste streams as part of the project file held by WGS. The hazardous waste determinations may use two approaches to determine whether a waste is characteristic:

- Process knowledge may be used if there is sufficient existing information to characterize the waste. Process knowledge may include direct knowledge of the source of the contamination and/or existing validated analytical data.
- Analysis of representative samples of the waste stream may be performed by either specialized RCRA protocols or standard protocols for sampling and laboratory analysis that are not specialized RCRA methods and other equivalent regulatory approved methods. In addition, process knowledge may influence the amount of sampling and analysis required in order to perform characterization.

Land disposal restrictions for hazardous wastes are addressed in 40 CFR 268, “Land Disposal Restrictions.” The INEEL-specific requirements for treatment, storage, and disposal are addressed in the INEEL WAC (DOE-ID 2003b). After the hazardous waste determinations are completed, the INEEL Interim Waste Tracking System profile number is assigned and the appropriate information entered into the tracking system.

6.2.7 Waste Disposition

At the conclusion of the investigations (or when deemed necessary), industrial waste will be disposed of in the INEEL landfill following the protocols and completing the forms identified by the INEEL WAC (DOE-ID 2003b). To achieve this waste management activity, industrial waste will be turned over to CFA Operations personnel for management under existing facility waste streams and in accordance with standing facility procedures. When sufficient quantities of waste have been accumulated to ship to one of the INEEL waste management units, or off the INEEL to a commercial waste management facility, WGS will be contacted and the appropriate forms will be completed and submitted for approval as required. The waste generator interface will provide assistance in packaging and transporting the waste.

Waste that is determined to be RCRA-hazardous is not intended to be stored in a permitted treatment, storage, and disposal facility. However, if this becomes necessary, it will be labeled as CERCLA to facilitate eventual management in accordance with CERCLA treatment, storage, or disposal that may become available. Should further characterization of the contaminated waste be necessary, services will be requested from environmental monitoring and Sample and Analysis Management (formerly the Sample Management Office). Requesting these services requires completion of a form on website <http://webhome4/SampAna/>, “Sample and Analytical Service Authorization Form (SAF).” For final disposition of RCRA-hazardous waste, WGS will be contacted to determine whether the waste

qualifies for disposal under terms of the Master Task Agreement F98-180611 Hazardous Waste or its successor.

All low-level radioactive and mixed wastes will be handled and disposed of in accordance with the requirements set forth in the INEEL WAC (DOE-ID 2003b). Care should be taken to ensure that all containers used to store waste or sampling equipment are in a “like-new” condition. Following completion of sampling, the individual waste streams destined for disposal at the Radioactive Waste Management Complex or WROC will be approved and prepared for disposal in accordance with the requirements of the INEEL WAC (DOE-ID 2003b).

Management of contaminated wastes, generated at a subcontract laboratory during analytical testing, will be the responsibility of the subcontract laboratory. However, overall management of the samples must be in accordance with the requirements of MCP-3480, “Environmental Instructions for Facilities, Processes, Materials and Equipment.” Specifically, the MCP requires that the facility Environmental, Safety, and Health (ES&H) manager provide written approval prior to return of any media and that written documentation of sample disposition be developed and maintained. To initiate the return of these wastes to the INEEL, the subcontract laboratory will notify Bechtel BWXT Idaho, LLC (BBWI) in the form of a written report identifying the known volume and characteristics of each waste type, including shipping and packaging details. Final authorization for the return of wastes will be provided in writing from BBWI, LLC to the subcontract laboratory. In the event that laboratory wastes are returned, WGS will be contacted and they will determine the disposition of those wastes.

6.2.8 Record Keeping and Reporting

Records and reports related to waste management are required to be maintained as indicated by MCP-3475, “Temporary Storage of CERCLA-Generated Waste at the INEEL.” Some of these may be completed by others, but must be available either at the ARA/PBF or in the WAG 5 project files. These records will include, but not be limited to, the following:

- Hazardous waste determinations, characterization information, and statements of process knowledge (by others)
- CWSU and CSA inspection reports and log-in, log-out history
- Training records
- Documentation with respect to all spills.

6.3 Project-Specific Waste Streams

Several distinct waste stream types anticipated to be generated during this project have been identified. Some of these waste types will be clean, but many will be contaminated with radionuclides. Subsequent to generation, any or all of the waste may be reclassified; therefore, the intended waste management strategies for each are outlined below. The following sections describe the expected waste that will require compliant storage and/or disposal, including the intended management strategy from the time of generation until final disposition. Field and laboratory personnel will be responsible for segregating wastes. The anticipated quantities have also been approximated; however, they are to be considered a rough order-of-magnitude because in some cases, the type of contamination present cannot be determined before sampling and analysis. Estimated waste volumes are based on historical sampling activities conducted in support of other CERCLA actions conducted at the INEEL in addition to

calculated volumes based upon drawings and discussions with Environmental Restoration (ER) personnel.

6.3.1 Personal Protective Equipment

The PPE in the form of coveralls, leather and rubber gloves, and anticontamination clothing may be generated for the sampling activities. The anticipated quantity of PPE to be generated, and requiring disposal as a result of the sampling activities, is 0.76 m^3 (1 yd^3) classified as clean for each annual sampling event.

6.3.2 Purge Water

Liquid waste from groundwater sampling will consist of purge water from the deep-purged water system and **SRPA** that has been pumped from the wells. Purge water will be generated before sample collection in accordance with GDE-127 to remove standing water from the well casing. This standard operating procedure requires that three to five well volumes be removed from the well, and other water quality parameters must be met before samples are collected. The estimated amount of purge water generated from each well is provided in Table 4-1.

Purge water from all wells, except Hwy-3, TRA-06, and USGS-58, will be disposed of as directed by TRA Waste Generator Services. Currently, this purge water is disposed to the TRA-715 Evaporation Pond as wastestream TRA-0293. Summarized data from each round of groundwater monitoring shall be provided to the TRA Environmental Compliance lead following each round of monitoring. Should there be any increases in the RCRA constituent concentrations, purge water disposal to the TRA-715 Evaporation Pond may be denied or delayed. Purge water from TRA-06 and USGS-58 will be discharged to the ground near the wellheads. Purging of the Hwy-3 well is not required, as the pump runs continuously.

6.3.3 Plastic Sheeting

Plastic sheeting may be used at the wells to act as an environmental barrier to contamination and to provide a laydown site for staging equipment and tooling. Based upon historical use of plastic sheeting at environmental remediation sites, the anticipated volume to be generated and requiring disposal as a result of the sampling activities is 0.76 m^3 (1 yd^3) classified as clean for each annual sampling event.

6.3.4 Unused/Unaltered Sample Material

Unusedunaltered sample material will be generated from the sampling activities in the form of waters not required for sampling and analysis. In most cases, the analytical laboratory will be responsible for disposal of the unusedunaltered sample material and for any wastes generated as a result of analyzing the samples. In the event that unused sample material must be returned from the laboratory, only the unused, unaltered samples in the original sample containers will be accepted from the laboratory. These samples will be consolidated and sent to a final disposal site.

6.3.5 Sample Containers

Sample containers will become a waste stream following analysis. As with unusedunaltered sample material, the analytical laboratory will be responsible for disposal of the sample containers. In the event that unused sample material must be returned from the laboratory, the samples will be consolidated for disposal and the sample containers, by virtue of the empty container rule, will be disposed of as clean waste.

6.3.6 Miscellaneous Wastes

Miscellaneous wastes such as trash, labels, rags, and other miscellaneous debris may be generated during the project. The anticipated quantity of miscellaneous wastes to be generated and requiring disposal as a result of the sampling activities is 1.53m³ (2 yd³), classified as clean. Clean miscellaneous waste will be removed to the CFA landfill.

7. DOCUMENTATION MANAGEMENT AND SAMPLE CONTROL

Section 7.1 summarizes document management and sample control. Documentation includes field logbooks used to record field data and sampling procedures, chain-of-custody forms, and sample container labels. Section 7.2 outlines the sample handling and discusses chain-of-custody, radioactivity screening, and sample packaging for shipment to the analytical laboratories. The analytical results from these sampling efforts will be documented in a series of technical memoranda that are prepared on an annual basis.

7.1 Documentation

The field team leader (FTL) will be responsible for controlling and maintaining all field documents and records, and for ensuring that all required documents will be submitted to the ER Administrative Records and Document Control Center. All entries will be made in permanent ink. All errors will be corrected by drawing a single line through the error and entering the correct information; all corrections will be initialed and dated.

7.1.1 Sample Container Labels

Waterproof, gummed labels generated from the SAP database will display information such as the sample ID number, the name of the project, sample location, and analysis type. In the field, labels will be completed and placed on the containers before collecting the sample. Information concerning sample date, time, preservative used, field measurements of hazards, and the sampler's initials will be filled out during field sampling.

7.1.2 Field Guidance Forms

Field guidance forms, which are provided for each sample location, will be generated from the SAP database to ensure unique sample numbers.

These forms are used to facilitate sample container documentation and organization of field activities, and they contain information regarding the following:

- Media
- Sample ID numbers
- Sample location
- Aliquot ID
- Analysis type
- Container size and type
- Sample preservation

7.1.3 Field Logbooks

In accordance with Administrative Records and Document Control (ARDC) format, field logbooks will be used to record information necessary to interpret the analytical data. All field logbooks will be controlled and managed according to MCP-1194, “Logbook Practices for ER and Deactivation, Decontamination, and Decommissioning Projects.”

7.1.3.1 Sample/Shipping Logbook. The field teams will use sample logbooks. Each sample logbook will contain information such as:

- Physical measurements (if applicable)
- All QC samples
- Shipping information (e.g., collection dates, shipping dates, cooler ID number, destination, chain-of-custody number, name of shipper)
- All team activities
- Problems encountered
- Visitor log
- List of site contracts.

This logbook will be signed and dated at the end of each day’s sampling activities

7.7.3.2 Field Instrument Calibration/Standardization Logbook. A logbook containing records of calibration data will be maintained for each piece of equipment requiring periodic calibration or standardization. This logbook will contain log sheets to record the date, time, method of calibration, and instrument ID number.

7.2 Sample Handling and Shipping

All samples will be handled in accordance with MCP-9364, “Handling, Storing, and Shipping Samples.” Qualified (Sampling and Analysis Management-approved) analytical and testing laboratories will be used to analyze the groundwater samples.

7.2.1 Sample Containers

Analytical samples for laboratory analyses will be collected in precleaned bottles and packaged in accordance with Section 2.3.2.1, “Sample Containers,” in the QAPjP (DOE-ID 2002).

7.2.2 Sample Preservation

Preservation of water samples will be performed before sample collection. The temperature will be checked periodically before shipment to certify adequate preservation for those samples requiring temperatures at 4°C (39°F) for preservation. Ice chests (coolers) containing frozen reusable ice will be used to chill samples, if required, in the field after sample collection.

7.2.3 Chain-of-Custody Procedures

The chain-of-custody procedures will be followed in accordance with the requirements of PRD-5030, “Environmental Requirements for Facilities, Processes, Materials, and Equipment,” MCP-3480, “Environmental Instructions for Facilities, Processes, Materials, and Equipment,” MCP-1192, “Chain-of-Custody and Sample Labeling for ER and D&D&D Projects,” and the QAPjP (DOE-ID 2002). Sample bottles will be stored in a secured area, which is accessible only to the field team members.

7.2.4 Transportation of Samples

Samples will be shipped in accordance with the regulations issued by the DOT (49 CFR 171 through 178) and EPA sample handling, packaging, and shipping methods (40 CFR 261.4[d]). All samples will be packaged in accordance with the requirements set forth in MCP-3480 and PRD-5030.

7.2.4.1 Custody Seals. Custody seals will be placed on all shipping containers in such a way as to ensure that sample integrity is not compromised by tampering or unauthorized opening. Clear-plastic tape will be placed over the seals to ensure that the seals are not damaged during shipment.

7.2.4.2 On-Site and Off-Site Shipping. An on-Site shipment is any transfer of material within the perimeter of the INEEL. Site-specific requirements for transporting samples within Site boundaries and those required by the Shipping/Receiving Department will be followed. Shipment within the INEEL boundaries will conform to DOT requirements, as stated in 49 CFR, “Transportation.” Off-Site sample shipment will be coordinated with Packaging and Transportation Department personnel, as necessary, and will conform to all applicable DOT requirements.

7.3 Document Revision Requests

Revisions to this document will follow MCP-233, “Process for Developing, Releasing, and Distributing ER Documents (Supplemental to MCP-135 and MCP-9395).”

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Appendix A
Sampling and Analysis Plan Tables

Plan Table Number: WAG2-GW-MAR04

SAP Number:

Date: 08/27/2003

Plan Table Revision: 0.0

Project: WAG 2 GROUNDWATER MONITORING - MARCH 2004

Project Manager: WELLS, R. P.

SMO Contact: MCGRIFF, T. W.

Sample Description					Sample Location					Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coil Type	Sampling Method	Planned Date	▲	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
TRA178	REG	GROUND WATER	GRAB		03/08/2004	TRA	PERCHED WELL	PW-11	134.5																				
TRA179	REG	GROUND WATER	GRAB		03/08/2004	TRA	PERCHED WELL	PW-12	133																				
TRA180	REG	GROUND WATER	GRAB		03/08/2004	TRA	PERCHED WELL	PW-14	126																				
TRA181	REG	GROUND WATER	GRAB		03/08/2004	TRA	PERCHED WELL	USGS-53	90																				
TRA182	REG/QC	GROUND WATER	DUP		03/08/2004	TRA	PERCHED WELL	USGS-54	91																				
TRA183	REG	GROUND WATER	GRAB		03/08/2004	TRA	PERCHED WELL	USGS-55	81																				
TRA184	REG	GROUND WATER	GRAB		03/08/2004	TRA	PERCHED WELL	USGS-56	80																				
TRA185	REG	GROUND WATER	GRAB		03/08/2004	TRA	AQUIFER WELL	HIGHWAY-3	750																				
TRA186	REG	GROUND WATER	GRAB		03/08/2004	TRA	AQUIFER WELL	TRA-06	562																				
TRA187	REG	GROUND WATER	GRAB		03/08/2004	TRA	AQUIFER WELL	TRA-07	501																				
TRA188	REG	GROUND WATER	GRAB		03/08/2004	TRA	AQUIFER WELL	TRA-08	501.5																				
TRA189	REG	GROUND WATER	GRAB		03/08/2004	TRA	AQUIFER WELL	USGS-56	503																				
TRA190	REG	GROUND WATER	GRAB		03/08/2004	TRA	AQUIFER WELL	USGS-65	488																				
TRA191	REG	GROUND WATER	GRAB		03/08/2004	TRA	AQUIFER WELL	MIDDLE-1923	729.7																				
TRA192	QC	GROUND WATER	PES		03/08/2004	TRA	PERCHED WELL	PW-01	NA																				

The sampling activity displayed on this table represents the first 8 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

AT1: Chromium

AT11:

AT2: Chromium - Filtered

AT12:

AT3: Gamma Spec

AT13:

AT4: Sr-90

AT14:

AT5: Tritium

AT15:

AT6:

AT16:

AT7:

AT17:

AT8:

AT18:

AT9:

AT19:

AT10:

AT20:

Analysis Suites:

Contingencies:

Comments:

Plan Table Number: WAG2-GW-MAR04

SAP Number:

Date: 08/27/2003

Plan Table Revision: 0.0

Project: WAG 2 GROUNDWATER MONITORING - MARCH 2004

Project Manager: WELLS, R. P.

SMD Contact: MCGRIFF, T. W.

[illegible]

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

Comments:

Analysis Suites:		Confingencies	
AT10		AT20	
AT9		AT19	
AT8		AT18	
AT7		AT17	
AT6		AT16	
AT5	Tribum	AT15	
AT4	Sc-90	AT14	
AT3	Gamma Spec	AT13	
AT2	Chromium - Filtered	AT12	
AT1	Chromium	AT11	
		Comments:	

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number WAG2-GW-MAR05

Page 1 of 2

SAP Number:

Date: 08/27/2003

Plan Table Revision: 0.0

Project WAG 2 GROUNDWATER MONITORING- MARCH 2005

Project Manager: WELLS, R P

SMO Contact: MCGRUFF, T W

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20	
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	5C	CU	R4	RB	R8																
TRA270	REG	GROUND WATER	GRAB		03/08/2005	TRA	PERCHED WELL	PW-11	134.5	1	1	1	1	1																
TRA271	REG	GROUND WATER	GRAB		03/08/2005	TRA	PERCHED WELL	PW-12	133	1	1	1	1	1																
TRA272	REG	GROUND WATER	GRAB		03/08/2005	TRA	PERCHED WELL	PW-14	126	1	1	1	1	1																
TRA273	REG	GROUND WATER	GRAB		03/08/2005	TRA	PERCHED WELL	USGS-53	90	1	1	1	1	1																
TRA274	REG/QC	GROUND WATER	DUP		03/08/2005	TRA	PERCHED WELL	USGS-54	91	2	2	2	2	2																
TRA275	REG	GROUND WATER	GRAB		03/08/2005	TRA	PERCHED WELL	USGS-55	81	1	1	1	1	1																
TRA276	REG	GROUND WATER	GRAB		03/08/2005	TRA	PERCHED WELL	USGS-56	80	1	1	1	1	1																
TRA277	REG	GROUND WATER	GRAB		03/08/2005	TRA	AQUIFER WELL	HIGHWAY-3	750	1	1	1	1	1																
TRA278	REG	GROUND WATER	GRAB		03/08/2005	TRA	AQUIFER WELL	TRA-06	562	1	1	1	1	1																
TRA279	REG	GROUND WATER	GRAB		03/08/2005	TRA	AQUIFER WELL	TRA-07	501	1	1	1	1	1																
TRA280	REG	GROUND WATER	GRAB		03/08/2005	TRA	AQUIFER WELL	TRA-08	501.5	1	1	1	1	1																
TRA281	REG	GROUND WATER	GRAB		03/08/2005	TRA	AQUIFER WELL	USGS-58	503	1	1	1	1	1																
TRA282	REG	GROUND WATER	GRAB		03/08/2005	TRA	AQUIFER WELL	USGS-65	498	1	1	1	1	1																
TRA283	REG	GROUND WATER	GRAB		03/08/2005	TRA	AQUIFER WELL	MIDDLE-1823	729.7	1	1	1	1	1																
TRA284	QC	GROUND WATER	PES		03/08/2005	TRA	PERCHED WELL	PW-01	NA	1	1	1	1	1																

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

AT1: Chromium	AT11: _____	Comments: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
AT2: Chromium, Filtered	AT12: _____	
AT3: Gamma Spec	AT13: _____	
AT4: _____	AT14: _____	
AT5: Tritium	AT15: _____	
AT6: _____	AT16: _____	
AT7: _____	AT17: _____	
AT8: _____	AT18: _____	
AT9: _____	AT19: _____	
AT10: _____	AT20: _____	

Analysis Suites

Contingencies

[illegible]

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

AT1	Chromium
AT2:	Chromium, Filtered
AT3	Gamma Spec
AT4	Si-90
AT5	Tritium
AT6:	
AT7	
AT8	
AT9	
AT10	

AT11	
AT12	
AT13	
AT14	
AT15	
AT16	
AT17	
AT18:	
AT19:	
AT20	

Analysis Suites

Contingencies

SAP Number

Dale. 08/27/2003

Plan Table Revision: 00

Project: WAG 2 GROUNDWATER MONITORING. MARCH 2006

Project Manager WELLS, R. P.

SMO Contact: MCGRIFF, T. W.

[illegible]

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels.

Comments.

AT1	
AT2	Chromium - Filtered
AT3	Gamma Spec
AT4	Sr-90
AT5	Trilium
AT6	
AT7	
AT6	
AT9	
AT16	

AT11	
AT12	
AT13	
AT14	
AT15	
A116	
AT17	
AT16	
AT19	
AT20	

Analysis Suites

Contingencies

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coli Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										5C	CU	R4	RB	R8															
TRA531	REG	GROUNDWATER	GRAB		03/08/2007	TRA	PERCHED WELL	PW-11	1345	1	1	1	1	1															
TRA532	REG	GROUNDWATER	GRAB		03/08/2007	TRA	PERCHED WELL	PW-12	133	1	1	1	1	1															
TRA533	REG	GROUNDWATER	GRAB		03/08/2007	TRA	PERCHED WELL	PW-14	126	1	1	1	1	1															
TRA534	REG	GROUND WATER	GRAB		03/08/2007	TRA	PERCHED WELL	USGS-53	90	1	1	1	1	1															
TRA535	REG/QC	GROUNDWATER	DUP		03/08/2007	TRA	PERCHED WELL	USGS-54	91	2	2	2	2	2															
TRA536	REG	GROUNDWATER	GRAB		03/08/2007	TRA	PERCHED WELL	USGS-55	81	1	1	1	1	1															
TRA537	REG	GROUNDWATER	GRAB		03/08/2007	TRA	PERCHED WELL	USGS-56	80	1	1	1	1	1															
TRA538	REG	GROUNDWATER	GRAB		03/08/2007	TRA	AQUIFER WELL	HIGHWAY-3	750	1	1	1	1	1															
TRA539	REG	GROUNDWATER	GRAB		03/08/2007	TRA	AQUIFER WELL	IRA-06	562	1	1	1	1	1															
TRA540	REG	GROUNDWATER	GRAB		03/08/2007	TRA	AQUIFER WELL	TRA-07	501	1	1	1	1	1															
TRA541	REG	GROUNDWATER	GRAB		03/08/2007	TRA	AQUIFER WELL	IRA-08	501.5	1	1	1	1	1															
TRA542	REG	GROUNDWATER	GRAB		03/08/2007	TRA	AQUIFER WELL	USGS-58	503	1	1	1	1	1															
TRA543	REG	GROUNDWATER	GRAB		03/08/2007	TRA	AQUIFER WELL	USGS-65	498	1	1	1	1	1															
TRA544	REG	GROUNDWATER	GRAB		03/08/2007	TRA	AQUIFER WELL	MIDDLE-1823	7297	1	1	1	1	1															
TRA545	GC	GROUNDWATER	PES		03/08/2007	TRA	PERCHED WELL	PW-01	NA	1	1	1	1	1															

The sampling activity displayed on this table represents the first 6 to 9 character of the sample identification number

AT1	Chromium
AT2	Chromium, Filtered
AT3	Gamma Spec
AT4	Sr-90
AT5	Tritium
AT6	
AT17	
AT8	
AT9	
AT10	

Analysis Suites.

The complete sample identification number will appear on the sample labels

AT11		Comments
AT12		
AT13		
AT14		
AT15		
AT16		
AT17		
AT18		
AT19		
AT20		

Contingencies

SMO Contact: MCGRIFF T W.

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number		The complete sample identification number will appear on the sample labels.	
AT1	Chromium	AT11	
AT2	Chromium, Filtered	AT12	
AT3	Gamma Spec	AT13	
AT4	si-90	AT14	
AT5	Tritium	AT15:	
AT6:		AT16:	
AT7:		AT17:	
AT9		AT18	
AT9		AT19	
AT10		AT20	

Contingencies

A-10

SAP Number

Dale 08/27/2003

PlanTable Revision 0.0

Project WAG 2 GROUNDWATER MONITORING- MARCH 2008

Project Manager WELLS, R. P

SMD Contact MCGRUFF, T W

[illegible]

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

AT1	Chromium
AT2	Chromium, Filtered
AT3	Gamma Spec
AT4	Sr-90
AT5	Tritium
AT6	
AT7	
AT8	
AT9	
AT10	

AT11	
AT12	
AT13	
AT14:	
AT15:	
AT16	
AT17	
AT18	
AT19	
AT20	

Comments

Analysis Suites.

contingencies:

Plan Table Number WAG2-GW-OCT03

Page 1 of 2

SAP Number

Sampler Millward, A. L.

Date 09/15/2003

Plan Table Revision: 0.0

Project OU 2-14, TRA WELLS - OCTOBER 2003 GROUNDWATER SAMPLING

Project Manager WELLS, R. P.

SMO Contact MCGRIFF, T. W.

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																				
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20	
Sampling Activity	Sample Type	Sample Matrix	Coil Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	SC	CU	UX	RH	R8																
TRA057	REG	GROUND WATER	GRAB		10/06/03	TRA	PERCHED WELL	PW-11	134.5	1	1	1	1	1																
TRA058	REG	GROUNDWATER	GRAB		10/06/03	TRA	PERCHED WELL	PW-12	133	1	1	1	1	1																
TRA059	REG	GROUND WATER	GRAB		10/06/03	TRA	PERCHED WELL	PW-14	126	1	1	1	1	1																
TRA060	REG	GROUNDWATER	GRAB		10/06/03	TRA	PERCHED WELL	USGS-53	90	1	1	1	1	1																
TRA061	REG/QC	GROUNDWATER	DUP		10/06/03	TRA	PERCHED WELL	USGS-54	91	2	2	2	2	2																
TRA062	REG	GROUNDWATER	GRAB		10/06/03	TRA	PERCHED WELL	USGS-55	81	1	1	1	1	1																
TRA063	REG	GROUNDWATER	GRAB		10/06/03	TRA	PERCHED WELL	USGS-56	80	1	1	1	1	1																
TRA064	REG	GROUNDWATER	GRAB		10/06/03	TRA	AQUIFER WELL	HIGHWAY-3	750	1	1	1	1	1																
TRA065	REG	GROUNDWATER	GRAB		10/06/03	TRA	AQUIFER WELL	TRA-06	562	1	1	1	1	1																
TRA066	REG	GROUNDWATER	GRAB		10/06/03	TRA	AQUIFER WELL	TRA-07	501	1	1	1	1	1																
TRA067	REG	GROUNDWATER	GRAB		10/06/03	TRA	AQUIFER WELL	TRA-08	501.5	1	1	1	1	1																
TRA068	REG	GROUNDWATER	GRAB		10/06/03	TRA	AQUIFER WELL	USGS-58	503	1	1	1	1	1																
TRA069	REG	GROUNDWATER	GRAB		10/06/03	TRA	AQUIFER WELL	USGS-65	498	1	1	1	1	1																
TRA070	REG	GROUNDWATER	GRAB		10/06/03	TRA	AQUIFER WELL	MIDDLE-1823	729.7	1	1	1	1	1																
TRA071	QC	GROUNDWATER	PES		10/06/03	TRA	PERCHED WELL	FW-01	NA	1	1	1	1	1																

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

AT1 Chromium

AT11

Comments

AT2 Chromium - Filtered

AT12

Note to samplers: Samples ending in CU, Chromium - Filtered are to be filtered in the field prior to

AT3 Iodine-129 (low detection level)

AT13

AT4 Radiochemistry Suite 1

AT14

AT5: Tritium

AT15

AT6

AT16

AT7

AT17

AT8

AT18

AT9:

AT19:

AT10

AT20

Analysis Suites

Contingencies.

Radiochemistry Suite 1 To-99, Gamma Spec Sr-90

Page 2 of 2

Sampler Millward A L.

SMO Contact MCGRIFF, T. W.

[illegible]

The sampling activity displayed in this table represents the **first** 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

Chromium

Chromium. Filtered

Iodine-129 (low detection level)

Radiochemistry - Suite 1

Tritium

AT10:

Analysts Suites

Radiochemistry - Suite 1.Tc-99, Gamma Spec Sr-90

AT11

AT12

AT13:

AT14

AT15:

AT16

AT17

AT10

AT19

AT20

Contingencies

Comments

Note to samplers: Samples ending in CU, Chromium. Filtered, are to be filtered at the field prior to

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number WAG2-GW-OCT04

Page 1 of 2

SAP Number

Dab. 0812712003

Ran Table Revision 0 0

Project WAG 2 GROUNDWATER MONITORING. OCTOBER 2004

Project Manager WELLS, R. P

SMO Contact MCGRIFF, T W

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coil Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										SC	CU	R4	RB	R8															
TRA120	REG	GROUND WATER	GRAB		10/20/2004	TRA	PERCHED WELL	PW-11	134.5	1	1	1	1	1															
TRA121	REG	GROUND WATER	GRAB		10/20/2004	TRA	PERCHED WELL	PW-12	133	1	1	1	1	1															
TRA122	REG	GROUND WATER	GRAB		10/20/2004	TRA	PERCHED WELL	PW-14	126	1	1	1	1	1															
TRA123	REG	GROUND WATER	GRAB		10/20/2004	TRA	PERCHED WELL	USGS-53	90	1	1	1	1	1															
TRA124	REG/QC	GROUND WATER	DUP		10/20/2004	TRA	PERCHED WELL	USGS-54	91	2	2	2	2	2															
TRA125	REG	GROUND WATER	GRAB		10/20/2004	TRA	PERCHED WELL	USGS-55	81	1	1	1	1	1															
TRA126	REG	GROUND WATER	GRAB		10/20/2004	TRA	PERCHED WELL	USGS-56	80	1	1	1	1	1															
TRA127	REG	GROUND WATER	GRAB		10/20/2004	TRA	AQUIFER WELL	HIGHWAY-3	750	1	1	1	1	1															
TRA128	REG	GROUND WATER	GRAB		10/20/2004	TRA	AQUIFER WELL	TRA-06	582	1	1	1	1	1															
TRA129	REG	GROUND WATER	GRAB		10/20/2004	TRA	AQUIFER WELL	TRA-07	501	1	1	1	1	1															
TRA130	REG	GROUND WATER	GRAB		10/20/2004	TRA	AQUIFER WELL	TRA-08	501.5	1	1	1	1	1															
TRA131	REG	GROUND WATER	GRAB		10/20/2004	TRA	AQUIFER WELL	USGS-58	503	1	1	1	1	1															
TRA132	REG	GROUND WATER	GRAB		10/20/2004	TRA	AQUIFER WELL	USGS-65	498	1	1	1	1	1															
TRA133	REG	GROUND WATER	GRAB		10/20/2004	TRA	AQUIFER WELL	MIDDLE-1823	729.7	1	1	1	1	1															
TRA134	QC	GROUND WATER	PES		10/20/2004	TRA	PERCHED WELL	PW-01	NA	1	1	1	1	1															

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number

The complete sample identification number will appear on the sample labels

AT1: _____
AT2 Chromium - Filtered _____
AT3 Gamma Spec _____
AT4 Sr-90 _____
AT5 Tritium _____
AT6 _____
AT7 _____
AT8 _____
AT9 _____
AT10 _____

AT11 _____
AT12 _____
AT13 _____
AT14 _____
AT15 _____
AT16 _____
AT17 _____
AT18 _____
AT19 _____
AT20 _____

Comments

Analysis Suites

Contingencies:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Sample Description					Planned Date	Area	Type of Location	Location	Depth (ft)	Enter Analysis Types (AT) and Quantity Requested																							
Sampling Activity	Sample Type	Sample Matrix	Coil Type	Sampling Method						AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20				
TRA136	QC	GROUND WATER	RNST		10/20/2004	TRA	QC	EQUIP RINSEATE	NA	1	1	1	1	1																			
TRA136	QC	GROUND WATER	FBLK		10/20/2004	TRA	QC	FIELD BLANK	NA	1	1	1	1	1																			
																											</						

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

Comments:

AT11:

AT12: Chromium - Filtered

AT13: Gamma Spec

AT14: Sr-90

AT15: Tritium

AT16:

AT17:

AT18:

AT19:

AT10:

Analysis Suites:

Contingencies:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number WAG2-GW-OCT05

Page 1 of 2

SAP Number

Date: 08/21/2003

Plan Table Revision 00

Project WAG 2 GROUNDWATER MONITORING .OCTOBER 2005

Project Manager WELLS, R P

SMO Contact MCGRIFF, T W

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										5C	CU	R4	RB	R6															
TRA375	REG	GROUND WATER	GRAB		10/20/2005	TRA	PERCHED WELL	PW-11	134.5	1	1	1	1	1															
TRA376	REG	GROUND WATER	GRAB		10/20/2005	TRA	PERCHED WELL	PW-12	133	1	1	1	1	1															
TRA377	REG	GROUND WATER	GRAB		10/20/2005	TRA	PERCHED WELL	PW-14	126	1	1	1	1	1															
TRA378	REG	GROUND WATER	GRAB		10/20/2005	TRA	PERCHED WELL	USGS-53	90	1	1	1	1	1															
TRA379	REG/QC	GROUND WATER	DUP		10/20/2005	TRA	PERCHED WELL	USGS-54	91	2	2	2	2	2															
TRA380	REG	GROUND WATER	GRAB		10/20/2005	TRA	PERCHED WELL	USGS-55	81	1	1	1	1	1															
TRA381	REG	GROUND WATER	GRAB		10/20/2005	TRA	PERCHED WELL	USGS-56	80	1	1	1	1	1															
TRA382	REG	GROUND WATER	GRAB		10/20/2005	TRA	AQUIFER WELL	HIGHWAY-3	750	1	1	1	1	1															
TRA383	REG	GROUND WATER	GRAB		10/20/2005	TRA	AQUIFER WELL	TRA-06	562	1	1	1	1	1															
TRA384	REG	GROUND WATER	GRAB		10/20/2005	TRA	AQUIFER WELL	TRA-07	501	1	1	1	1	1															
TRA385	REG	GROUND WATER	GRAB		10/20/2005	TRA	AQUIFER WELL	TRA-08	501.5	1	1	1	1	1															
TRA386	REG	GROUND WATER	GRAB		10/20/2005	TRA	AQUIFER WELL	USGS-58	503	1	1	1	1	1															
TRA387	REG	GROUND WATER	GRAB		10/20/2005	TRA	AQUIFER WELL	USGS-65	498	1	1	1	1	1															
TRA388	REG	GROUND WATER	GRAB		10/20/2005	TRA	AQUIFER WELL	MIDDLE-1823	729.7	1	1	1	1	1															
TRA389	QC	GROUND WATER	PES		10/20/2005	TRA	PERCHED WELL	PW-01	NA	1	1	1	1	1															

The sampling activity displayed in this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels.

AT1 Chromium
AT2 Chromium, Filtered
AT3 Gamma Spec
AT4
AT5 Tritium
AT6
AT7
AT8
AT9
AT10

AT11:
AT12
AT13
AT14
AT15
AT16
AT17
AT18:
AT19
AT20

Comments

Analysis Suites

Contingencies

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number. WAG2-GW-OCT06

Page 1 of 2

SAP Number

Date 08/27/2003

Plan Table Revision. 00

Project WAG 2 GROUNDWATER MONITORING, OCTOBER 2006

Project Manager WELLS, R. P

SMO Contact: MCGRIFF, T. W

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
Sampling Activity	Sample Type	Sample Matrix	Coil Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
										SC	CU	R4	RB	R8															
TRA455	REG	GROUND WATER	GRAB		10/20/2006	TRA	PERCHED WELL	PW-11	134.5	1	1	1	1	1															
TRA456	REG	GROUND WATER	GRAB		10/20/2006	TRA	PERCHED WELL	PW-12	133	1	1	1	1	1															
TRA457	REG	GROUND WATER	GRAB		10/20/2006	TRA	PERCHED WELL	PW-14	126	1	1	1	1	1															
TRA458	REG	GROUND WATER	GRAB		10/20/2006	TRA	PERCHED WELL	USGS-53	90	1	1	1	1	1															
TRA459	REG/QC	GROUND WATER	DUP		10/20/2006	TRA	PERCHED WELL	USGS-54	91	2	2	2	2	2															
TRA460	REG	GROUND WATER	GRAB		10/20/2006	TRA	PERCHED WELL	USGS-55	81	1	1	1	1	1															
TRA461	REG	GROUND WATER	GRAB		10/20/2006	TRA	PERCHED WELL	USGS-56	80	1	1	1	1	1															
TRA462	REG	GROUND WATER	GRAB		10/20/2006	TRA	AQUIFER WELL	HIGHWAY-3	750	1	1	1	1	1															
TRA463	REG	GROUND WATER	GRAB		10/20/2006	TRA	AQUIFER WELL	TRA-06	562	1	1	1	1	1															
TRA464	REG	GROUND WATER	GRAB		10/20/2006	TRA	AQUIFER WELL	TRA-07	501	1	1	1	1	1															
TRA465	REG	GROUND WATER	GRAB		10/20/2006	TRA	AQUIFER WELL	TRA-08	501.5	1	1	1	1	1															
TRA466	REG	GROUND WATER	GRAB		10/20/2006	TRA	AQUIFER WELL	USGS-58	503	1	1	1	1	1															
TRA467	REG	GROUND WATER	GRAB		10/20/2006	TRA	AQUIFER WELL	USGS-65	498	1	1	1	1	1															
TRA468	REG	GROUND WATER	GRAB		10/20/2006	TRA	AQUIFER WELL	MIDDLE-1823	729.7	1	1	1	1	1															
TRA489	QC	GROUND WATER	PES		10/20/2006	TRA	PERCHED WELL	PW-01	NA	1	1	1	1	1															

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.

The complete sample identification number will appear on the sample labels

AT1: Chromium	AT11: _____	Comments _____
AT2: Chromium-Filtered	AT12: _____	_____
AT3: Gamma Spec	AT13: _____	_____
AT4: Sr-90	AT14: _____	_____
AT5: Tritium	AT15: _____	_____
AT6: _____	AT16: _____	_____
AT7: _____	AT17: _____	_____
AT8: _____	AT18: _____	_____
AT9: _____	AT19: _____	_____
AT10: _____	AT20: _____	_____

Analysis Suites:

Contingencies:

SMO Contact: MCGRIFF.T W

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number		The complete sample identification number will appear on the sample labels		Comments
AT1:	Chromium	AT11		
AT2	Chromium, Filtered	AT12		
AT3	Gamma Spec	AT13		
AT4:		AT14		
AT5:		AT15		
AT6		AT16		
AT7		AT17		
AT8		AT18:		
AT9		AT19		
AT10		AT20		

Contingencies

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Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: WAG2-GW-OCT07

Page 1 of 2

SAP Number

Date 08/27/2003

Plan Table Revision: 00

Project WAG 2 GROUNDWATER MONITORING, OCTOBER 2007

Project Manager WELLS, R P

SMO Contact: MCGRIFF, T W

Sample Description					Planned Date	Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
										AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Sampling Method		Area	Type of Location	Location	Depth (ft)	5C	CJ	R4	RB	R8															
TRA555	REG	GROUND WATER	GRAB		10/20/2007	TRA	PERCHED WELL	PW-11	134.5	1	1	1	1	1															
TRA556	REG	GROUND WATER	GRAB		10/20/2007	TRA	PERCHED WELL	PW-12	133	1	1	1	1	1															
TRA557	REG	GROUND WATER	GRAB		10/20/2007	TRA	PERCHED WELL	PW-14	126	1	1	1	1	1															
TRA558	REG	GROUNDWATER	GRAB		10/20/2007	TRA	PERCHED WELL	USGS-53	90	1	1	1	1	1															
TRA559	REG/QC	GROUND WATER	DUP		10/20/2007	TRA	PERCHED WELL	USGS-54	91	2	2	2	2	2															
TRA560	REG	GROUNDWATER	GRAB		10/20/2007	TRA	PERCHED WELL	USGS-55	81	1	1	1	1	1															
TRA561	REG	GROUNDWATER	GRAB		10/20/2007	TRA	PERCHED WELL	USGS-56	80	1	1	1	1	1															
TRA562	REG	GROUNDWATER	GRAB		10/20/2007	TRA	AQUIFER WELL	HIGHWAY-3	750	1	1	1	1	1															
TRA563	REG	GROUNDWATER	GRAB		10/20/2007	TRA	AQUIFER WELL	IRA-06	562	1	1	1	1	1															
TRA564	REG	GROUNDWATER	GRAB		10/20/2007	TRA	AQUIFER WELL	IRA-07	501	1	1	1	1	1															
TRA565	REG	GROUNDWATER	GRAB		10/20/2007	TRA	AQUIFER WELL	IRA-08	501.5	1	1	1	1	1															
TRA566	REG	GROUND WATER	GRAB		10/20/2007	TRA	AQUIFER WELL	USGS-58	503	1	1	1	1	1															
TRA567	REG	GROUNDWATER	GRAB		10/20/2007	TRA	AQUIFER WELL	USGS-65	498	1	1	1	1	1															
TRA568	REG	GROUNDWATER	GRAB		10/20/2007	TRA	AQUIFER WELL	MIDDLE-1823	729.7	1	1	1	1	1															
TRA569	QC	GROUNDWATER	PES		10/20/2007	TRA	PERCHED WELL	PW-01	NA	1	1	1	1	1															

Analysis Suites

Contingencies:

SMO Contact: MCGRIFF, T W.

The sampling activity displayed on this table represents the first 6 to 9 characters of the sample identification number.		The complete sample identification number will appear on the sample labels	
AT1: Chromium		AT11	Comments
AT2: Chromium - Filtered		AT12	
AT3: Gamma Spec		AT13	
AT4: Sr-90		AT14	
AT5: Tritium		AT15:	
AT6:		AT16:	
AT7:		AT17	
AT8		AT18	
AT9		AT19	
AT10		AT20	

Contingencies

A-22